

IN THE CLAIMS:

The following is a complete listing of the claims in this application, reflects all changes currently being made to the claims, and replaces all earlier versions and all earlier listings of the claims:

1. (Currently Amended) An image pick-up apparatus comprising a wavelength converter for converting an incident radiation to a light having a wavelength detectable with a photoelectric conversion element on a sensor substrate on which plural photoelectric conversion elements and switching elements are deposited ~~disposed~~, wherein a flattening layer having a flat face on which ~~making a~~ ~~contact with the wavelength converter~~ is deposited, is provided between the sensor substrate and wavelength converter.

2. (Original) An image pick-up apparatus according to Claim 1, wherein the flattening layer is obtained by flattening a protective layer provided on the sensor substrate.

3. (Original) An image pick-up apparatus according to Claim 1, wherein the flattening layer is provided on a protective layer on the sensor substrate.

4. (Original) An image pick-up apparatus according to Claim 1, wherein a second flattening layer is provided on the wavelength converter.

5. (Original) An image pick-up apparatus according to Claim 4, wherein the second flattening layer covers the end face of the wavelength converter.

6. (Original) An image pick-up apparatus according to Claim 1, wherein the surface of the wavelength converter is flattened.

7. (Original) An image pick-up apparatus according to Claim 4, wherein a light reflection film is provided on the second flattening layer.

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8. (Original) An image pick-up apparatus according to Claim 6, wherein a light reflection film is provided on the flattened wavelength converter.

9. (Original) An image pick-up apparatus according to Claim 1, wherein the wavelength converter comprises a scintillator.

10. (Original) An image pick-up apparatus according to Claim 9, wherein the scintillator comprises a columnar crystal.

11. (Original) An image pick-up apparatus according to Claim 9, wherein the scintillator comprises a CsI crystal.

12. (Original) An image pick-up apparatus according to Claim 7, wherein the light reflection film is made of an aluminum film.

13. (Original) An image pick-up apparatus according to Claim 8, wherein the light reflection film is made of an aluminum film.

14. (Original) An image pick-up apparatus according to Claim 8, having plural sensor substrates.

15. (Currently Amended) An image pick-up apparatus comprising plural sensor substrates on which plural pairs of a photoelectric conversion element and a switching element are deposited ~~disposed~~,

wherein the plural sensor substrates comprise ~~comprising~~ flattening layers on which a wavelength converter is deposited ~~provided on each flattening layer~~.

16. (Original) An image pick-up apparatus according to Claim 15, wherein a second flattening layer is provided on the wavelength converter.

17. (Original) An image pick-up apparatus according to Claim 16, wherein the second flattening layer covers the end face of the wavelength converter.

18. (Original) An image pick-up apparatus according to Claim 16, wherein a light reflection film is provided on the second flattening layer.

19. (Original) An image pick-up apparatus according to Claim 15, wherein the wavelength converter comprises a scintillator.

20. (Original) An image pick-up apparatus according to Claim 19, wherein the scintillator layer comprises a columnar crystal.

21. (Original) An image pick-up apparatus according to Claim 20, wherein the scintillator layer comprises a CsI crystal.

22. (Original) An image pick-up apparatus according to Claim 18, wherein the light reflection film is made of an aluminum film.

23. (Currently Amended) An image pick-up system comprising an image pick-up apparatus provided with a wavelength converter for converting an incident radiation to a light having a wavelength detectable with a photoelectric conversion element on a sensor substrate on which plural photoelectric conversion elements and switching elements are deposited ~~disposed~~, wherein a flattening layer having a flat face on which ~~making a contact with the wavelength converter is deposited~~, is provided between the sensor substrate and wavelength converter, comprising:

a signal processing means for processing the signal from the image pick-up apparatus; and

a display means for displaying the signal from the signal processing means.

24. (Original) An image pick-up system according to Claim 23, further comprising a telecommunication means for transferring the signal from the signal processing means.

25. (Original) An image pick-up apparatus system to Claim 23, further comprising a recording means for recording the signal from the signal processing means.

26. (Original) An image pick-up system according to Claim 23, further comprising a storage means for storing the signal from the signal processing means.

27. (Currently Amended) An image pick-up system comprising:  
an image pick-up apparatus comprising plural sensor substrates on which plural photoelectric conversion elements and switching elements are deposited ~~disposed~~, a flattening ~~layer~~ layers being deposited ~~provided~~ on the plural ~~respective~~ sensor substrates and a wavelength converter being deposited ~~provided~~ on the ~~each~~ flattening layer, comprising:

a signal processing means for processing the signal from the image pick-up apparatus; and

a display means for displaying the signal from the signal processing means.

28. (Original) An image pick-up system according to Claim 27, further comprising a recording means for recording the signal from the signal processing means.

29. (Original) An image pick-up system according to Claim 27, further comprising a telecommunication means for transferring the signal from the signal processing means.


30. (Original) An image pick-up system according to Claim 27, further comprising a storage means for storing the signal from the signal processing means.

31. (Currently Amended) A method for manufacturing an image pick-up apparatus comprising the steps of:

forming a protective layer on a sensor substrate on which plural photoelectric conversion elements and switching elements are deposited ~~disposed~~;

forming a flattening layer having a flat surface on the protective layer; and

depositing ~~forming~~ a wavelength converter on the flattening layer.

 32. (Original) A method for manufacturing the image pick-up apparatus according to Claim 31, comprising a step for providing a second flattening layer on the wavelength converter.

33. (Original) A method for manufacturing the image pick-up apparatus according to Claim 32, wherein the second flattening layer covers the end face of the wavelength converter.

34. (Original) A method for manufacturing the image pick-up apparatus according to Claim 31, comprising a step of flattening the wavelength converter.

35. (Original) A method for manufacturing the image pick-up apparatus according to Claim 32, comprising a step for providing a light reflection film on the second flattening layer.

36. (Original) A method for manufacturing the image pick-up apparatus according to Claim 34, comprising a step of providing a light reflection film on the flattened wavelength converter.

37. (Original) A method for manufacturing the image pick-up apparatus according to Claim 31, wherein the step for forming the wavelength converter comprises a vacuum deposition step.

38. (Currently Amended) A method for manufacturing the image pick-up apparatus comprising the steps of:

forming a protective layer on a sensor substrate on which plural photoelectric conversion elements and switching elements are deposited ~~disposed~~;

flattening the surface of the protective layer; and

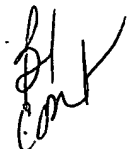
depositing ~~forming~~ a scintillator layer on the flattened protective layer.

39. (Original) A method for manufacturing the image pick-up apparatus according to Claim 38, comprising the steps of forming a second flattening layer on the wavelength converter.

40. (Original) A method for manufacturing the image pick-up apparatus according to Claim 39, wherein the second flattening layer covers the end face of the wavelength converter.

41. (Original) A method for manufacturing the image pick-up apparatus according to Claim 38, comprising the step of flattening the wavelength converter.

42. (Original) A method for manufacturing the image pick-up apparatus according to Claim 39, comprising the step of forming a reflection film on the second flattening layer.



43. (Original) A method for manufacturing the image pick-up apparatus according to Claim 41, comprising the step of forming a light reflection film on the flattened wavelength converter.

44. (Original) A method for manufacturing the image pick-up apparatus according to Claim 38, wherein the step for forming the wavelength converter comprises a vapor deposition step.

45. (Currently Amended) A method for manufacturing an image pick-up apparatus comprising the steps of:


~~providing~~ disposing plural sensor substrates on which plural pairs of a photoelectric conversion element and a switching element are ~~deposited~~ disposed, a flattening layer being formed on the respective plural sensor substrates; and



depositing ~~providing~~ a wavelength converter on the flattened layer.

46. (Original) A method for manufacturing an image pick-up apparatus according to Claim 45, comprising the step of forming a second flattening layer on the wavelength converter.

47. (Original) A method for manufacturing an image pick-up apparatus according to Claim 46, wherein the second flattening layer is provided so as to cover the end face of the scintillator layer.



48. (Original) A method for manufacturing an image pick-up apparatus according to Claim 46, comprising a step of providing a light reflection layer on the second flattening layer.

49. (Original) A method for manufacturing an image pick-up apparatus according to Claim 45, wherein the step for providing the wavelength converter comprises a vacuum deposition step.

50. (Original) A method for manufacturing an image pick-up apparatus according to Claim 45, wherein the wavelength converter comprises a scintillator made of a columnar crystal.

51. (Original) A method for manufacturing an image pick-up apparatus according to Claim 45, wherein the wavelength converter comprises a CsI crystal.

52. (New) An image pick-up apparatus comprising a wavelength converter for converting an incident radiation to a light having a wavelength detectable with a photoelectric conversion element on a sensor substrate on which plural photoelectric conversion elements and switching elements are deposited,

wherein a flattening layer having a flat face on which the wavelength converter is deposited, is provided between the sensor substrate and wavelength converter,  
and

wherein the photoelectric conversion elements comprise non-single crystalline semiconductor material.

53. (New) The image pick-up apparatus according to Claim 52, wherein the photoelectric conversion elements comprise an amorphous silicon film.

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